Geographic Information System Applications

Outputs

- Propagation coverages (HF and VHF) for one or more transmitters draped over surfaces.

- Interference and overlap coverages (VHF).

- 2D and 3D visualization environments.

- Fly-through visualization capabilities.

ITS has developed and continues to improve a suite of Geographic Information System (GIS) based applications incorporating propagation models for outdoor and indoor analyses. Databases for GIS use, including terrain, satellite and aircraft imagery, roads and other transportation infrastructure layers, building data and population, are becoming more available and affordable. These databases can be easily connected to GIS systems and can be shared among users in web-based or standalone GIS applications. The Institute has developed generic and application-specific GIS programs that aid Government agencies, private cellular companies, public and private television stations, transportation companies, and consultants in the performance of their missions to efficiently manage the U.S. telecommunications infrastructure.

One GIS-based tool developed by ITS is the Communication Systems Planning Tool (CSPT-VHF). CSPT is a menu- and icon-driven propagation model developed for frequencies from 20 MHz to 20 GHz that allows the user to connect to a variety of image catalogs and terrain libraries that cover most of the world. The user can create specific analysis areas using these catalogs and libraries and can then

Figure 1. A CSPT-VHF study for San Francisco showing both 2D (top) and 3D (bottom) results.

perform propagation scenarios for his/her application. These applications can range from outdoor coverage studies of large-scale areas of hundreds of square miles to indoor propagation studies of one building in an urban environment. Figure 1 shows a sample case of a transmitter coverage of the San Francisco Bay, shown in both 2D and 3D. CSPT allows the user to transition into 3D and fly through the environment.
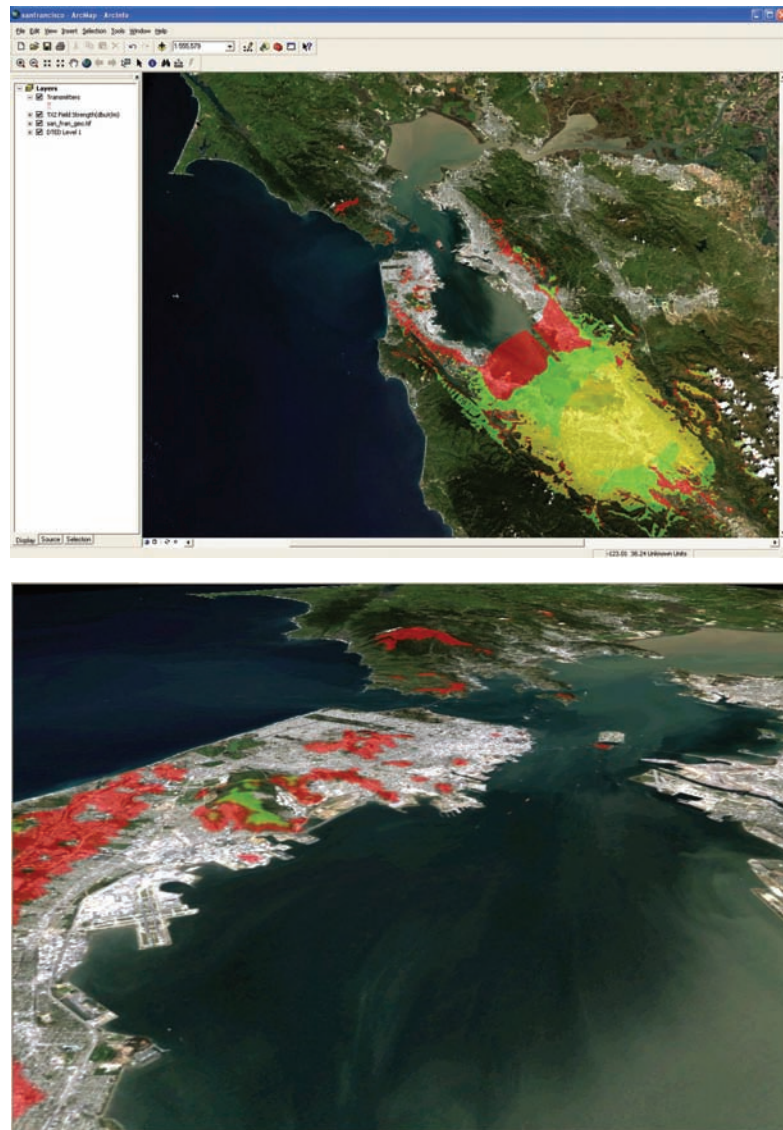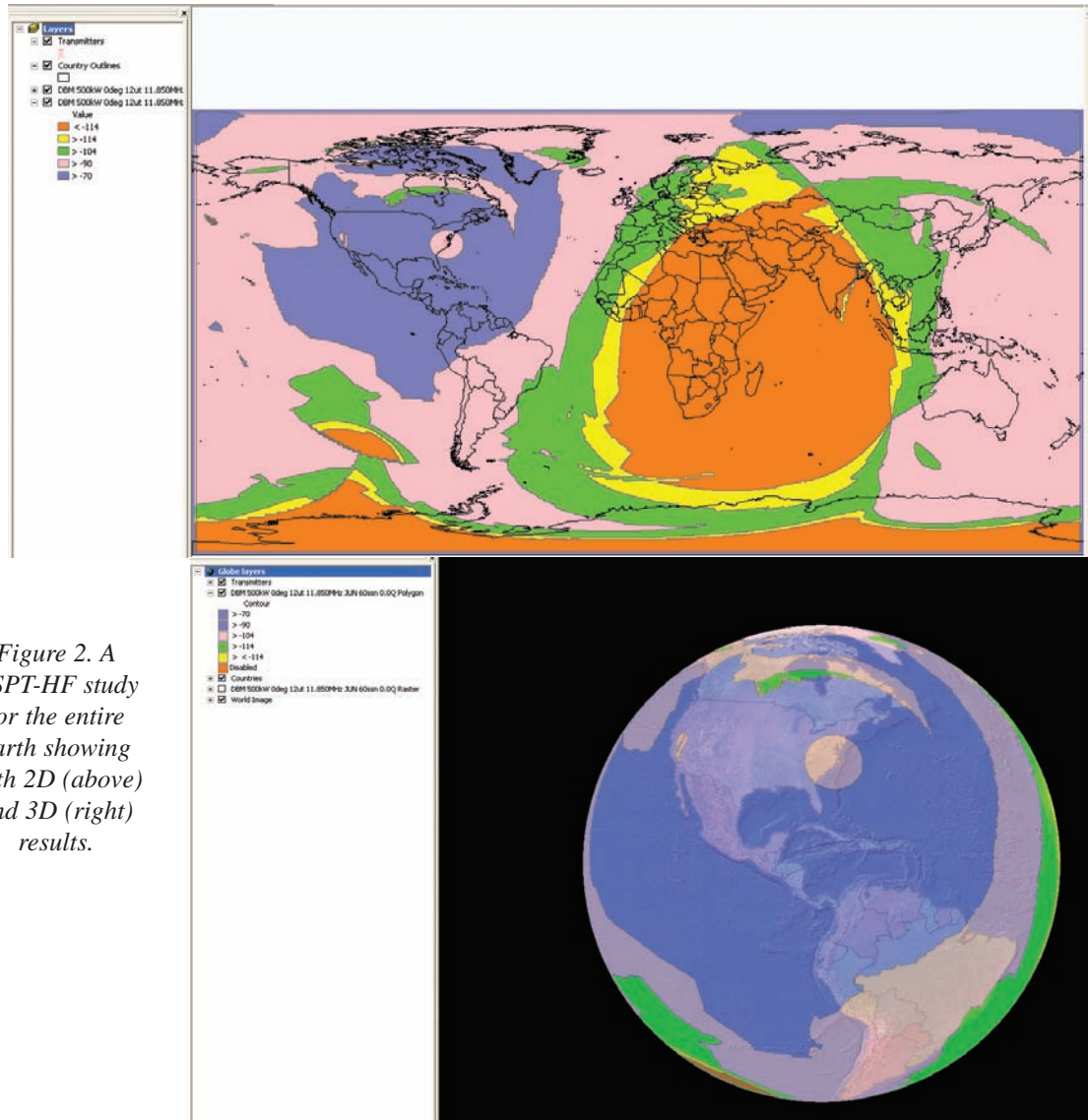
Figure 2. A CSPT-HF study for the entire earth showing both 2D (above) and 3D (right) results.

A second tool is the CSPT-HF model which provides the user with a GIS front end and back end to the ITS HF ICEPAC model. The GIS tool allows the user greater flexibility in creating scenarios for HF area coverage studies. These studies are not limited to nine scenarios as in the ICEAREA model. The output results of ICEPAC are imported into the GIS tool and can be displayed in 2D or 3D, as shown in Figure 2.

The general flow of the CSPT GIS tool is as follows. The user defines an area within which a study will be performed. This analysis area can be defined graphically by zooming into a map of the world or of the U.S. or by defining the latitude and longitude of the boundaries of the desired area. The user then imports desired GIS information such as political boundaries, roads, rivers, special imagery, or application-specific GIS data. After creating the analysis area, the user creates or imports transmitter, receiver, and antenna data. Lastly, the user selects the type of coverage and the propagation model to be used in the analysis.

Coverages, composites, and interference analyses can be imported into GIS visualization tools allowing the user to see and often fly through their studies so that a better understanding of the analysis results can be obtained.

For more information, contact:
Robert O. DeBolt
(303) 497-5324
e-mail rdebolt@its.bldrdoc.gov